



RESEARCH ARTICLE.....

Design aspects of Shark Gill nets of Satpati, Mahatashtra (India)

SHREYAS KHATAVKAR, AJAY DESAI AND ASHISH S. MOHITE

ABSTRACT..... Gill net is one of the popular fishing methods along the west coast of India. However, there are regional variation in the design, construction and operation. The present study deals with design, technical specification and operation of Shark gill nets operated off Satpati, Maharashtra. Shark set gill nets were made up of Polyamide (PA) multifilament of diameter 210x4x3 to 210x6x3 mm. Green and red coloured twine was commonly used for the main webbing in Satpati. The mesh size used for this gill net ranged from 90 to 100 mm for the main webbing having. The hanging co-efficient ranged between 0.39 to 0.50 and the hung length varied from 25 to 30 m and the total hung depth varied from 5.07 to 6.15 m. The fleet length of Shark gill net ranged from 2375 to 2875 m. The depth of the operation for Shark gill nets ranged from 60-90 m and were operated as bottom set gill net.

KEY WORDS..... Gill net, Design, Shark, *Shahenshah* or *Maghari*, *Scoliodon laticaudus*

HOW TO CITE THIS ARTICLE - Khatavkar, Shreyas, Desai, Ajay and Mohite, Ashish S. (2016). Design aspects of Shark Gill nets of Satpati, Mahatashtra (India). *Asian J. Animal Sci.*, **11**(2): 96-100.
DOI : 10.15740/HAS/TAJAS/11.2/96-100.

ARTICLE CHRONICLE - Received : 08.07.2016; Revised : 08.10.2016; Accepted : 22.10.2016

Author for Corresponding -

ASHISH S. MOHITE
Department of Fisheries
Engineering, College of Fisheries,
Shirgaon, RATNAGIRI (M.S.) INDIA
Email: ashishmohite@yahoo.com

See end of the article for

Coopted authors'

INTRODUCTION.....

Gillnets are of special interest to small-scale fishermen, due to the simple design, low investment, high energy efficiency and the requirement of only simple non-specialised small craft for their operation. Being a low energy fishing method, gillnet fishing is favoured in recent years in the context of escalating fuel costs. It is a highly selective gear, as the fish of a particular size in relation to the selected mesh size only is caught while smaller fishes are able to escape. It is a low energy fishing method using relatively low powered vessels expending fuel only for propulsion and not for actual fishing operation (Thomas *et al.*, 2010).

Maharashtra is one of the major maritime states of India having 720 km of coast line spread over six districts

viz., Thane, Palghar, Mumbai, Raigad, Ratnagiri and Sindhudurg. In Palghar, a total of 350 gillnetters were in operation (Anonymous, 2014). Design and general characteristics of marine gill nets of Kerala have been discussed by Vijayan *et al.* (1993) and Thomas and Hridayanathan (2006). Gill nets are used extensively by the small-scale artisanal fishermen in the fresh, brackish and coastal water (Solarin and Kusemiju, 2003; Emmanuel *et al.*, 2008 and Emmanuel, 2009). In gill net, the mesh should be shaped in such away, adjusting to the hanging co-efficient that, a fish is caught being gilled. The capture of fish is achieved by one mesh in a gill net, whereas by more than one mesh by entangling type, where it is caught by fouling of meshes in the fish body (Badapanda, 2012). However, the design and technical details of Shark gill nets of Satpati, Thane district of

Maharashtra state were not reported. The present study is the first attempt on the documentation of the design and technical specification of Shark fish gill nets operated from Satpati.

RESEARCH METHODS.....

The study was carried out during the fishing season from December 2014 to May 2015. The detail information regarding design and construction of gill nets was undertaken by physical sampling of the units and by collecting information from gill net owners in the study area. Structured data collection schedule formulated for the present study comprised of two major sections. The first section dealt with the particulars of gill net owner and the fishing vessel used for gill net operation. The second section deals with the technical specifications design aspects, rigging and the mode of operation of the different types of marine gill nets used by the fisherman of Satpati. The information included in the first section was recorded according to Kazi *et al.* (2010) whereas; the information in the second section was physically collected and recorded according to Pravin *et al.* (2009). The net design of the gill net was presented according to Nedelec (1975).

RESEARCH FINDINGS AND ANALYSIS.....

In the present study, the gear was operated by mechanized fishing vessel. The specification and design of Shark gill net is shown in Table 1 and Fig. 1, respectively. Shark gill nets in Satpati were locally called as “*Shahenshah*” or “*Maghari*”.

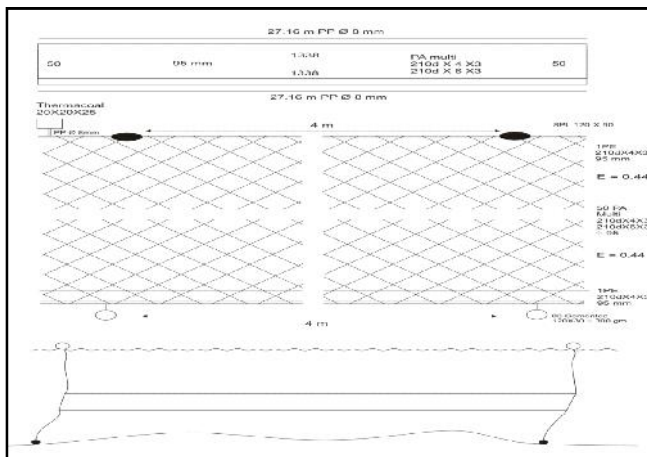


Fig. 1 : Design of Shark gill net operated from Satpati, Maharashtra

Polyamide (PA) multifilament twines were used for main webbing in bottom set gill net. Pravin *et al.* (1998) reported that the Shark gill nets of Gujarat were used as surface drift, column drift and bottom drift as well as set gill nets. In Kerala, the nets were operated as both drift net and set net (Thomas and Hridayanathan, 2006). Pravin *et al.* (2009) reported that Shark gill nets were operated as bottom set gill net in Assam.

In Satpati, Green and red coloured twines were commonly used for fabrication of main webbing. Multifilament yarn having specification of 210d x 4 x 3 and 210d x 6 x 3 were most commonly used according to the mesh size. It was recorded that, Polyamide (PA) multifilament of 210d x 6 x 3 was the most common material for the selvedge meshes for the Shark gill nets. Pravin *et al.* (1998) reported that the Shark gill nets from Gujarat were made up of PA twisted monofilament of 1 to 2.5 mm diameter and PA multifilament with twine specification of 210d x 9 x 3, 210d x 12 x 3 and 210d x 24 x 3. Thomas *et al.* (2005) recorded that the Shark gill nets with twine specification of 210d x 12 x 3 to 210d x 24 x 3 were operated in Gujarat, 210d x 6 x 3 to 210d x 9 x 3 in Karnataka, 210d x 6 x 3 to 210d x 12 x 3 in Kerala and 210d x 8 x 3 in Andaman Islands. Drift Shark gill nets of PA multifilament with specification 210d x 12 x 3 and Shark set gill nets of PA monofilament of 0.45 mm diameter were most commonly used along the Kerala coast (Thomas and Hridayanathan, 2006). Pravin *et al.* (2009) reported that the PA multifilament material with specification of 210d x 6 x 3 was used for Shark gill nets. Kazi *et al.* (2010) observed that in Ratnagiri PA monofilament of 0.5 to 1.0 mm diameter of twine was used.

During the present study, it was observed that the mesh size of Shark gill nets generally ranged between 90 to 100 mm with mean of 95.61 ± 0.36 mm for main webbing as well as for selvedge meshes. Vijayan *et al.* (1993) reported the mesh size of main webbing ranged from 250 to 350 mm in 1958 and 230 to 250 mm in 1991 from Kerala, which was larger than the mesh size observed during the present study. Pravin *et al.* (1998) recorded the mesh size from Gujarat in the range of 80 to 400 mm while, similarly Thomas *et al.* (2005) found the mesh size of 350 to 400 mm in Gujarat and 65 to 135 mm in Karnataka. Thomas and Hridayanathan (2006) reported the mesh size ranged from 90 to 250 mm for Shark gill nets from Kerala coast. Kazi *et al.* (2010)

reported that for Shark gill net in Ratnagiri, mesh size was varied from 90 to 100 mm. The upper range of mesh size of 100 mm observed during the present study for Shark gill nets was similar as compared to the higher upper range of mesh size recorded in Gujarat (Thomas

et al., 2005). The upper range of mesh size 350 mm was observed to be higher in comparison to the observations recorded during the present study (Vijayan *et al.*, 1993; Thomas *et al.*, 2005 and Thomas and Hridayanathan, 2006).

Table 1 Specification of Shark gill net (*Shehenshah / Maghari*) operated from Satpati, Maharashtra

| Station | Satpati | | |
|---|-----------------------------|---------------------------|------------------|
| Local name | <i>Shahenshah / Maghari</i> | | |
| Main webbing mesh size (mm) | 100 | 95 | 90 |
| Mean main webbing mesh size (mm) | | 95.61±0.36 | |
| Twine type | PA multifilament | PA multifilament | PA multifilament |
| Twine specification / diameter (mm) | 210x4x3, 210x6x3 | 210x4x3, 210x6x3 | 210x4x3, 210x6x3 |
| No. of meshes in depth | | 50 | |
| Horizontal hanging co-efficient (E) | 0.39-0.45 | 0.41- 0.47 | 0.44-0.50 |
| Mean horizontal hanging co-efficient (E) | | 0.44 ±0.003 | |
| Vertical hanging co-efficient (1-E2) | 0.79-0.84 | 0.77-0.83 | 0.75-0.80 |
| Mean vertical hanging co-efficient (1-E2) | | 0.79±0.002 | |
| No. of meshes per unit | | 1100-1600 | |
| Mean no. of meshes per unit | | 1338.88±26.47 | |
| Hung length (m) | | 25-30 | |
| Mean hung length (m) | | 27.16±0.26 | |
| Hung depth (m) | | 5-6 | |
| Colour webbing | | Green and red | |
| Selvedge twine type | | Polyamide multifilament | |
| Selvedge specification / diameter (mm) | | 210x4x3 | |
| Selvedge mesh size (mm) | | 90-100 | |
| No. of selvedge meshes in depth | | 2 | |
| Selvedge hung depth (m) | | 0.07-0.15 | |
| Total hung depth (m) | | 5.07-6.15 | |
| Head rope material | | Polypropylene | |
| Head rope diameter (mm) | | 8 | |
| Float material | | Polyvinyl Chloride | |
| Float dimension (mm) | | 150x90 / 120x90 | |
| No. of floats per unit | | 6-8 | |
| Mean no. of floats per unit | | 6.95±0.10 | |
| Foot rope material | | Polypropylene | |
| Foot rope diameter (mm) | | 8 | |
| Sinker material | | Cement | |
| Sinker dimension (mm) | | 120x30 | |
| Sinker weight (g) | | 250-300 | |
| No. of sinkers per unit | | 6-8 | |
| Mean no. of sinkers per unit | | 6.95±0.10 | |
| Total fleet length (m) | | 2375-2875 | |
| Mean total fleet length (m) | | 2641.56 ±18.08 | |
| Depth of operation (m) | | 60-90 | |
| Fishing craft | | Wooden and FRP mechanized | |
| Horse power of the engine (HP) | | 12 – 16 | |

The horizontal hanging co-efficient of the Shark gill net ranged from 0.39 to 0.50 with mean of 0.44 ± 0.003 . Average hanging co-efficient of 0.49 for Shark gill net was recorded by Thomas and Hridayanathan (2006) in Kerala. Similar observations were recorded by Kazi *et al.* (2010) in Ratnagiri they found that hanging coefficient of 0.41 to 0.51.

The hung length of each fishing unit for Shark gill net varied from 25 to 30 m with mean of 27.16 ± 0.26 m. Thomas and Hridayanathan (2006) observed the gill net units in Kerala with average hung length of 254 m. Similar observation was recorded in Ratnagiri, that 44.10 to 107.16 m by Kazi *et al.* (2010). The total hung depth for Shark fish gill nets varied from 5 to 6 m with mean of 5.5 m. It was calculated that mounted height was 62 per cent of total stretched height. Vijayan *et al.* (1993) recorded the hung depth of 3.7 m in 1958 and 7.0 m in 1991 for Shark gill nets from Kerala. In Kerala hung depth of 9.73 m was recorded by Thomas and Hridayanathan (2006) and in Ratnagiri 5.4 to 8.6 m was recorded by Kazi *et al.* (2010).

The total fleet length for Shark gill nets ranged from 2375 to 2875 m. with mean of 2641 ± 18.08 m. Thomas and Hridayanathan (2006) reported the Shark gill nets with the total net length of 800 to 1280 m with the depth of operation from 19 to 300 m while in Ratnagiri, it was 260 to 456 m with depth of operation 60 to 90 m by Kazi *et al.* (2010). The depth of the operation ranged between 60–90 m.

In the Shark set gill net, the accessories included the head rope, the foot rope, marker floats, master floats, flag floats and sinkers and head rope and foot rope of Polypropylene (PP) of 8 mm diameter. Expanded Polyvinyl chloride (PVC) of oval shaped (*Budhi*) floats

and circular cemented sinkers (*Ghata*) were used. In Shark gill nets 6 to 8 numbers of floats and sinkers were used in per unit. The floats materials were of 150x90 mm and 120x90 mm while the sinkers had 120x30 mm dimensions. The weight of sinkers was 250 to 300 gm. Also for marking purpose, flags (*Shinda*) used had dimension of 60x45 cm. One master float with the flags was attached at the end of the head rope and circular shaped cemented stone (*Athal*) were attached as master sinker at the end of the fleet to the foot rope. The main webbing consisted of sieving together 100 to 110 units joined by 'end rope to end rope' by making the knots on head and foot ropes; as well as seaming at regular interval throughout the depth of net to form a netting fleet (Kazi *et al.*, 2010 and 2012).

Conclusion :

The documented information on the design and technical specifications of Shark set gill net of Satpati, Maharashtra would serve as a base line information for the technological modifications the said gill net may undergo to increase its efficiency in the coming years.

Acknowledgement :

Authors wish to thank the authorities of College of Fisheries, Shirgaon, Ratnagiri (Dr. Balasaheb Sawant Kokan Krishi Vidyapeeth, Dapoli) for providing the necessary facilities and their kind encouragement and guidance during the course of the investigation.

COOPTED AUTHORS' –

SHREYAS KHATAVKAR AND AJAY DESAI, Department of Fisheries Engineering, College of Fisheries, Shirgaon, RATNAGIRI (M.S.) INDIA

LITERATURE CITED.....

- Anonymous (2014). Fish Production Report 2013-2014. Department of Fisheries, Government of Maharashtra.
- Badapanda, K.C. (2012). *Fishing Craft and Gear Technology*, pp 335-48. Narendra Publishing House, Delhi, (3).
- Emmanuel, B.E., Chukwu, L.O. and Azeez, L.O. (2008). Gill net selectivity and catch rates of pelagic fish in tropical coastal lagoonal ecosystem. *African J. Biotechnol.*, 7(21): 3962-3971.
- Emmanuel, B. E. (2009). The artisanal fishing gears, crafts technology and their efficiency in the Lekki lagoon, Nigeria. Ph. D. Thesis, University of Lagos, 268.
- Kazi, T.G., Mohite, A.S. and Jadhav, R.R. (2010). Design specification of Shark gill nets of Ratnagiri, Maharashtra. *Aquaculture*, 11(2): 135-139.
- Kazi, T.G., Mohite, A.S. and Jadhav, R.R. (2012). Design characteristics of mackerel drift gill nets of Ratnagiri, Maharashtra. *Asian*

J. Animal Sci., **7**(1):15-18.

Nedelec, C. (1975). FAO Catalogue of Small Scale Fishing Gear, *Fishing News Books (Ltd.)*, Farnham, Surrey, England: 191.

Pravin, P., Remesan, M.P. and Geaorge, Mathai (1998). Gill nets fishing in Gujarat. In: *Advances and Priorities in Fisheries Technology*, (Balachandran, K.K., Iyer, T.S.G, Madhavan, P., Joseph, J., Perigreen, P. A., Raghunath, M. R., and Varghese, M. D., Eds), 170-176.

Pravin, P., Thomas, S.N., Meenakumari, B., Baiju, M., Baruah, D., Barman, J., Kakti, B., Daimari, P. and Mumtaz, V.R. (2009). Design and General characteristics of Gill nets of Assam. *Fishery Technol.*, **46** (2):107-122.

Solarin, B.B. and Kusemiju, K. (2003). The fishery and aspect of gillnets designs and operation in the Lagos lagoon, Nigeria. *Nigerian J. Fisheries*, **1** : 62-69.

Thomas, S.N., Meenakumari, B., Pravin, P. and Mathai, G.P. (2005). Gill nets in marine fisheries of India. Monograph, *Agricultural Technology Information Center*, Central Institute of Fishery Technology (ICAR), Matsyapuri, Cochin.

Thomas, S.N. and Hridayanathan, C. (2006). Design and general characteristics of marine gill nets of Kerala. *Fishery Technol.*, **43** (1): 17-36.

Thomas, S.N. (2010). Coastal fisheries resources of India. Central Institute of Fisheries Technology, Cochin. *Society of Fisheries Technologists*, 314 – 326.

Vijayan, V., Varghese, M.D., Leela, Edwin, Thomas, S.N. and George, V.C. (1993). Coastal gill nets of Kerala – Changes in three decades, In: Low Energy Fishing, *Fishery Technology*. (Special Issue) Society of *Fisheries Technologists*, India: 172-176.

11th
Year
★★★★★ of Excellence ★★★★★